

Appl. No. 10/628,898
Examiner: Hung Henry V Nguyen, Art Unit 2851
In response to the Office Action dated July 13, 2004

Date: September 13, 2004
Attorney Docket No. 10112591

REMARKS

Applicant thanks the Examiner for indication of allowable subject matter in claims 3-10 and 13-20, and for acknowledging Applicant's claim to foreign priority and receipt of the certified copy of the priority document. Responsive to the Office Action mailed on July 13, 2004 in the above-referenced application, Applicant respectfully requests amendment of the above-identified application in the manner identified above and that the patent be granted in view of the arguments presented. No new matter has been added by this amendment.

Present Status of Application

Claims 1-20 are pending. Claims 1-2 and 11-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Ausschnitt et al. (U.S. Pat. 5,965,309). Claims 1-2 and 11-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Jun et al. (U.S. Pat. 6,700,648). Claims 1-2 and 11-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsumoto et al. (US 2002/0111038). Claims 3-10 and 13-20 are objected to as being dependent upon a rejected base claim, but are indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

In this paper, claim 1 has been amended to recite an exposure system comprising a compensation unit to receive at least one adjustment value of a corresponding equipment parameter *of the exposure system*, and compensate a corresponding overlay parameter according to the adjustment value and an adjustment formula *indicating the relationship between the equipment parameter and affected overlay parameter*, and an exposure device to perform overlay and exposure processes on a wafer using the compensated overlay parameter. Claim 11 has been amended to recite an exposure method comprising the steps of: receiving at least one adjustment value of a corresponding equipment parameter *of the exposure system*; compensating a corresponding overlay parameter according to the adjustment value and an adjustment formula *indicating the relationship between the equipment parameter and the affected overlay parameter*, and performing overlay and exposure processes on a wafer using the compensated overlay parameter. Support for the amendments can be found on pages 4-7 and in Figs. 1 and 4 of the application.

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Reconsideration of this application is respectfully requested in light of the amendments and the remarks contained below.

Rejections under 35 U.S.C. 102

Claims 1-20 are pending. Claims 1-2 and 11-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Ausschnitt et al. Claims 1-2 and 11-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Jun et al. Claims 1-2 and 11-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Matsumoto et al. The rejections are respectfully traversed for the reasons as follow.

None of the cited art teaches or suggests an exposure system comprising, *Inter alia*, a compensation unit to receive at least one adjustment value of a corresponding **equipment parameter of the exposure system**, and compensate a corresponding overlay parameter according to the adjustment value and an **adjustment formula indicating the relationship between the equipment parameter and affected overlay parameter**, as recited in claim 1.

Claim 1 recites an exposure system with recipe compensation for an *adjusted exposure device* in semiconductor manufacturing. The invention compensates related parameters when the exposure device encounters malfunction or failure, or for routine maintenance purpose, in which the exposure device needs to be adjusted.

In contrast, Ausschnitt et al, Jun et al, and Matsumoto et al provide methods for parameter adjustment between lot wafers processed by the exposure device.

Namely, Ausschnitt et al. introduce a set of parametric equations indicating the dependence of the shape and space dimensions on dose and focus in the neighborhood of the target values. See col. 21, lines 28-52. These equations indicate the relationship between the overlay parameters (the shape and space dimensions on dose and focus). However, Ausschnitt et al fail to teach or suggest equipment parameters as recited in claim 1.

Similarly, Jun et al. disclose adjusting parameters using equations based on the overlay parameters, such as OF-X, OF-Y, SC-X, SC-Y, ORT, W-ORT, RED-X, RED-Y, ROT-X, and

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ROT-Y. See col. 7, lines 7-19. Matsumoto et al also disclose calculating correction values according to the overlay parameters. See paragraphs 0048-0049.

In contrast, the formulas provided by the invention represent the relationship between equipment and overlay parameters. For example, as recited in claims 3-10, the overlay parameters comprise offset of X axis (Offset_X), offset of Y axis (Offset_Y), shot scaling of X axis (Shot Scaling X), shot scaling of Y axis (Shot Scaling Y), shot orthogonality (Shot Ortho), and shot rotation (Shot Rot), while the equipment parameters comprise FIA_X, FIA_Y, lens magnitude matching offset of X axis (Lens Mag Matching Offset X), machine shot scaling of Y axis (Machine Shot Scaling Y), LSA_X, LSA_Y, shot skewness (Shot Skew), and machine shot rotation (Machine Shot Rot).

None of the cited references teach or suggest the innovative concept of the adjustment formula indicating the relationship between equipment parameter and affected overlay parameter as recited in claim 1. It is therefore Applicant's belief that claim 1 is allowable over the cited references. Insofar as claims 2-10 directly or indirectly depend from claim 1, these are similarly believed to be allowable.

None of the cited art teaches or suggests an exposure method comprising, *inter alia*, the steps of receiving at least one adjustment value of a corresponding **equipment parameter of the exposure system** and compensating a corresponding overlay parameter according to the adjustment value and an **adjustment formula indicating the relationship between the equipment parameter and the affected overlay parameter**.

For the same reasons indicated above, it Applicant's belief that none of the cited references teach or suggest the innovative concept of the adjustment formula indicating the relationship between equipment parameter and affected overlay parameter as recited in claim 11. Applicant therefore submits that claim 11 is allowable over the cited references. Insofar as claims 12-20 directly or indirectly depend from claim 11, these are similarly believed to be allowable.

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Conclusion

The Applicant believes that the application is now in condition for allowance and respectfully requests so.

Respectfully submitted,



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